

CLAIMS

1. In a process for purifying an NF_3 stream containing fluorine, hydrogen fluoride, nitrogen oxides, and substantially free of oxygen difluoride, the improvement
5 which comprises:

removing hydrogen fluoride;

removing fluorine without removing a substantial amount of NF_3 and without generating oxygen difluoride;

removing the nitrogen oxides by adsorption in an adsorber; and,

10 recovering a purified NF_3 product.

2. The process of Claim 1 wherein the fluorine is selectively removed by contacting the stream with a metal component under conditions for forming a metal fluoride.
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3. The process of Claim 1 wherein the fluorine is selectively removed by reaction with a non-metal component under conditions for forming a non-metal fluoride.

4. The process of Claim 2 in which the metal component for selectively
20 removing fluorine is selected from the group consisting of a metal element, metal oxide, anhydrous metal hydroxide, metal sulfide, metal nitride, metal phosphide, metal arsenide, metal carbide, metal carbonate, metal silicide, metal germanide, metal boride and metal aluminide.

25 5. The process of Claim 4 wherein the metal element in said metal component is selected from the group consisting of tungsten, iron, zinc, silicon, aluminum, magnesium, calcium, and zirconium or mixtures thereof.

30 6. The process of Claim 4 wherein the fluorine is removed by contact with a metal component selected from the group consisting of aluminum oxide, anhydrous aluminum hydroxide, calcium oxide, anhydrous calcium hydroxide, strontium oxide, anhydrous strontium hydroxide, magnesium oxide, anhydrous magnesium hydroxide and lanthanum oxide.

7. The process of Claim 4 wherein the fluorine is removed by contact with a metal carbonate selected from the group consisting of calcium carbonate and sodium carbonate.

5 8. The process of Claim 4 wherein the byproduct HF is removed by condensation prior to effecting removal of fluorine from the NF_3 stream.

9. The process of Claim 4 wherein HF is removed subsequent to the removal of fluorine and the HF is removed by a method selected from the group consisting of condensation, scrubbing in an aqueous alkaline hydroxide solution and adsorption.

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10. The process of Claim 4 in which a zeolite is used as an adsorbent in the adsorber.

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11. The process of Claim 10 in which the zeolite is selected from the group consisting of mordenite and chabazite.

12. The process of Claim 9 wherein the residual impurities in the resulting NF_3 stream from the adsorber are removed by distillation.

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13. The process of Claim 3 wherein the non-metal component is selected from the group consisting of carbon and sulfur.

14. In a process for purifying NF_3 present in a reaction product stream wherein said NF_3 is produced by contacting gaseous F_2 , as the fluorine reactant, with an ammonium acid fluoride complex under conditions for generating a reaction product stream containing unreacted fluorine, byproduct hydrogen fluoride, and nitrogen oxides but substantially free of oxygen difluoride, the improvement which comprises:

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30 removing byproduct hydrogen fluoride;
removing fluorine without removing a substantial amount of NF_3 and without generating oxygen difluoride;
removing the nitrogen oxides by adsorption; and,
recovering a purified NF_3 product.

15. The process of Claim 14 wherein the reaction product stream contains from 5 to 20% fluorine by volume.

5 16. The process of Claim 15 in which a metal component is used for selectively removing fluorine and it is selected from the group consisting of a metal element, metal oxide, anhydrous metal hydroxide, metal sulfide, metal nitride, metal phosphide, metal arsenide, metal carbide, metal carbonate, metal silicide, metal germanide, metal boride and metal aluminide.

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17. The process of Claim 16 wherein the metal element in said metal component is selected from the group consisting of tungsten, iron, zinc, silicon, aluminum, magnesium, calcium and zirconium or mixtures thereof.

15 18 The process of Claim 14 wherein the fluorine is removed by contact with a metal component selected from the group consisting of aluminum oxide, anhydrous aluminum hydroxide, calcium oxide, anhydrous calcium hydroxide, strontium oxide, anhydrous strontium hydroxide, magnesium oxide, anhydrous magnesium hydroxide and lanthanum oxide.

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19. The process of Claim 14 wherein fluorine is selectively removed by reaction with a non-metal component under conditions for forming a non-metal fluoride.

25 20. The process of Claim 19 wherein the non-metal component is selected from the group consisting of carbon and sulfur.